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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|-----------------------|--------------------------|------------------------|
| 10/553,308 | 10/14/2005 | Philip Edward Haskell | 05-861 | 1898 |
| 20306 7590 07/31/2007 MCDONNELL BOEHNEN HULBERT & BERGHOFF LLP 300 S. WACKER DRIVE 32ND FLOOR CHICAGO, IL 60606 | | | EXAMINER LIU, HARRY K | |
| | | | ART UNIT 3662 | PAPER NUMBER |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|---|--|
| Office Action Summary | Application No. 10/553,308 | Applicant(s) HASKELL, PHILIP EDWARD | |
| | Examiner Harry Liu | Art Unit 3662 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9, 11-23 and 26-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9, 11-23 and 26-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 October 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>2/28/2006, 4/3/2006</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1,5,11,16,20, 26 are rejected under 35 U.S.C. 102(e) as being anticipated by Shapira (2006/0068848).

Regarding claims 1,16, Shapira discloses a phased array pair (Abstract) with adjustable electrical tilt (paragraph 0017) and having an array of antenna elements (Abstract) incorporating **a**) variable phase shifter (paragraph 0058) for introducing relative phase shift between first and second RF signals (see FIG. 3 below), **b**) splitting apparatus (splitter article 38) for dividing the relatively phase shifted first and second RF signals into component signals and **c**) a signal combining network for forming vectorial (a phase difference is a vector difference) combinations of the component signals to provide respective signal for each antenna element with corresponding angle of electrical tilt to phase shift (paragraph 0017).

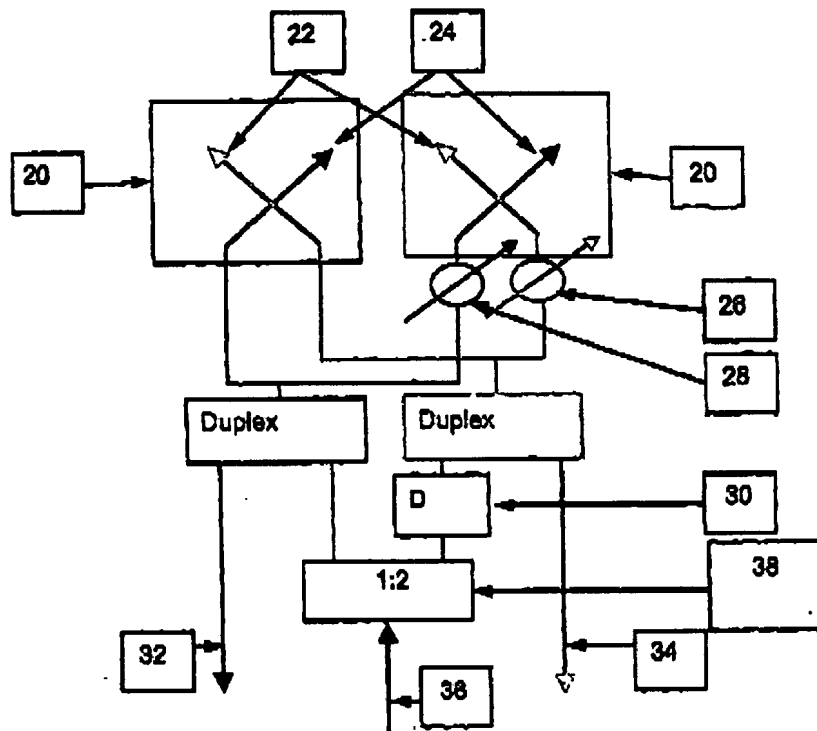


Fig. 3

Regarding claims 5, 11, 20, 26, Shapira discloses a splitting apparatus (article 38) divides component signal for input to the signal phase shifting (article 26, 28) and combining network (article 20) (see FIG. 3 above). Note that all devices are co-located on the same platform since they are antenna on the same sector of a same base station (claims 10, 26).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 12-13, 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shapira (2006/0068848).

Regarding claims 12, 27, Shapira discloses a phased array antenna but fails to specifically disclose use of first, second and third splitters and the second, third splitters collocated. It is known that sharing antenna in cellular base station is a common situation by splitting frequency carriers (say cellular and PCS band splitting) or splitting signal for further processing (say splitting cellular signal for cellular or E911 use). It would have been obvious to first doing a splitting of RF signal before it is further splitted into smaller frequency band.

Regarding claims 13, 28, Shapira discloses a phased array antenna with fixed phase shifter (paragraph 0075, article 918 in FIG. 9), combining network is arranged to operate in both transmit and receive mode (see FIG. 13) but fails to specifically disclose use of first variable phase shifter connected in a transmit mode, second variable phase shifter connected in receive mode. However, it is a common practice in a cellular base station having TX antenna and RX antenna separately. It would have been obvious to connect the claimed two variable phase shifter one at transmitting and one at receiving part in order to independently control the tilt in transmitting and receiving mode.

5. Claims 14-15, 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shapira (2006/0068848), as applied to claim 1 above, in view of Thomas (2004/0252055).

Regarding claims 14-15, 29-30, Shapira discloses use of two variable phase shifters and combiner but fails to disclose a plurality of variable phase shifters associated with respective operators and filtering (claim 14), respective pair of variable phase shifters for each operator (claims 15, 29), components have both forward and reverse signal processing (claim 30). However, Thomas teaches the use of filtering (paragraph 0009) and variable phase shifter associated with respective operator (two for each operator) (paragraph 0170) (FIG. 14) and Tilt control unit 704 (article 704 in FIG. 12). It would have been obvious to modify Shapira with Thomas by incorporating filtering and corresponding variable phase shifter, tilt control processing for respective operator in order to extract the wanted signal frequency and be capable of individually control each operator's tilt requirement in transmit or receive mode.

6. Claims 2,6-7,17, 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shapira (2006/0068848), as applied to claim 1 above, in view of Gordon (5410321).

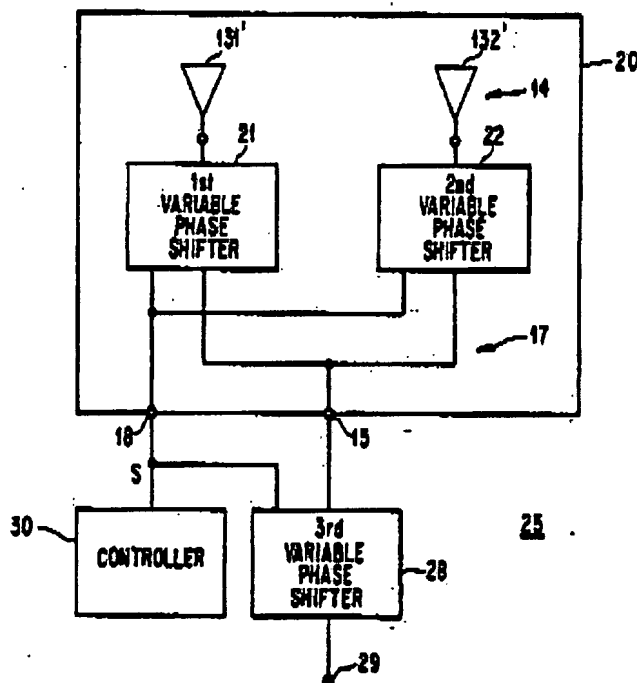
Regarding claims 2,6-7, 17, 21-22, Shapira discloses a phased array antenna but fails to specifically disclose use of odd number of antenna elements (for claims 2, 17) or 180 degrees (for claims 7, 22) hybrid couplers (for claims 6, 21). However, Gordon teaches the use of odd number antenna elements and 180 degrees hybrid coupler for combining signal. It would have been obvious to modify Shapira with Gordon by incorporating 180 degrees hybrid coupler and odd number elements in order to reduce interference between antenna elements.

7. Claims 3-4, 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shapira (2006/0068848), as applied to claim 1 above, in view of Kuramoto (5281974).

Regarding claims 3-4, 18-19, Shapira discloses a phased array antenna but fails to specifically disclose use of serial connection of first and second variable phase shifters (claim 3, 18) or a plurality of phase shifters such that some of the signals passed through all second variable phase shifters and some have not (claims 4, 19).

However, Kuramoto discloses use of first and second variable phase shifters and a plurality of variable phase shifters (see FIG 2 below). It would have been obvious to modify Shapira with Kuramoto in order to do impedance matching or reducing intermodulation noise.

FIG. 2



8. Claims 8-9, 23,31-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shapira (2006/0068848) in view of Gordon (5410321), as applied to claims 1, 6, 16, 21 above, and further in view of Boire (4749969).

Regarding claims 8-9, 23, 33, Shapira as modified by Gordon discloses all claim limitations except for specifying ring hybrid with circumference $(n+1/2)\lambda$, neighboring ports separated by $\lambda/4$ (claims 8, 23,33), input terminal with resistor for impedance matching (claims 9, 33). However, Boire teaches a 180 degree hybrid ring phase shifting apparatus with $1.5 (1+ \frac{1}{2})$ wavelength circumference and $\frac{1}{4}$ wavelength spacing ("rat race" column 1, lines 14-37) and resistor for impedance matching (column 3, lines 28-38). It would have been obvious to further modify Shapira with Boire by incorporating as claimed circumference, spacing and resistor in order to satisfy hybrid design specifications.

Regarding claims 31-32, Shapira as further modified by Boire discloses all claim limitations except for specifying hybrid are designed to convert input signal I1 and I2 into vector sum or difference. However, a ring hybrid with 180 degree hybrid implies signals are fed into the hybrid and converted either with 180 degree difference (difference) or no difference (sum).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry Liu whose telephone number is 571-270-1338. The examiner can normally be reached on Monday -Thursday and every other Friday..

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Tarcza can be reached on 571-272-6979. The fax phone number for the organization where this application or proceeding is assigned is 571-270-2338.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Harry Liu
Examiner
Art Unit 3662
July 24, 2007



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